

## **Hitachi Releases H8S/2282F CAN-Supporting High-Performance 16-Bit Microcomputer Providing Compact Single-Chip Implementation of an Automobile Dashboard System**

— Motor control timer, LCD controller, and CAN incorporated in a 100-pin package, for smaller, lower-cost systems and short development period —

Tokyo, October 7, 2002— Hitachi, Ltd. (TSE: 6501) today announced the H8S/2282F 16-bit single-chip microcomputer with on-chip flash memory, incorporating a meter gauge drive stepping motor control timer, LCD\*<sup>1</sup> controller for liquid crystal display, and in-vehicle network standard CAN\*<sup>2</sup> interface in a compact, low-pin-count package, for automobile dashboard (meter panel) system and vehicle body control applications. Sample shipments will begin on October 21, 2002 in Japan, and volume production in January 2003 in Japan.

To handle low-end dashboard systems, the H8S/2282F offers high performance of 20 MHz, plus various on-chip functions required for system implementation, all in a compact 100-pin package. The wide 0.65 mm pin pitch allows installation on a low-cost single-sided printed circuit board, for smaller, lower-cost systems.

A CAN bus wake-up function and 32 kHz subclock divider are also provided, enabling systems to be made smaller and development period to be shortened.

A mask ROM version has also been developed, and is scheduled for volume production starting in March 2003 in Japan.

Recently, the market trend of vehicle systems and FA and similar industrial systems have seen an increasing shift in communication systems from conventional serial communication to high-speed, high-reliability CAN bus communication. The standard automobile dashboard system display comprises four gauges, including speedometer and tachometer, and a need has arisen for a high-performance single-chip microcomputer capable of controlling these gauges in real time. To meet these needs, Hitachi has to date released a lineup of 12 products in the 144-pin H8S/2646 Series and 128-pin H8S/2636 Series of microcomputers with an on-chip CAN interface for dashboard system applications, targeting middle- to high-end systems. However, low-end systems are characterized by space limitations imposed by their installation position, and there is strong demand for a reduction in system size and cost through the use of single-chip implementation. Further demands include the ability to wake-up by the CAN bus operation when the system is in a power-down mode, and a frequency division function for obtaining 32 kHz from the main clock.

To meet these market needs for low-end systems, Hitachi has now developed the H8S/2282F 16-bit single-chip microcomputer with on-chip flash memory, offering single-chip system implementation that includes a stepping motor control timer, LCD controller, and built-in CAN interface, all in a compact, low-pin-count 100-pin package. The H8S/2282F employs a 0.35- $\mu$  m process, and incorporates an H8S/2000 CPU core in Hitachi top-end H8S series 16-bit microcomputer, achieving a minimum instruction execution time of 50 ns (at a 20 MHz operating frequency). This is an F-ZTAT™\*<sup>3</sup> product with 128 Kbytes of on-chip flash memory, using a single power supply for data writing and erasing. Major features of the H8S/2282F are as follows.

< Features >

1. Dashboard system implemented with compact, low-pin-count 100-pin package

(1) Direct drive of four gauges and an LCD in a dashboard system

A motor control PWM\*<sup>4</sup> timer with built-in drivers offers direct drive of the stepping motors driving four gauges -- speedometer, tachometer, fuel gauge, and water temperature indicator. A liquid crystal display of up to 28 segments  $\times$  4 commons lines for trip distance indication can also be directly driven, eliminating the need for externally mounted drivers.

(2) CAN support plus a CAN bus wake-up function

The H8S/2282F includes an HCAN\*<sup>5</sup> conforming to the Bosch CAN Ver. 2.0B active specification. The CAN interface allows data buffer storage of 16 messages, and achieves a maximum communication speed of 1 Mbps (bits per second). Also provided is a function that wakes up the microcomputer through CAN bus operation during the low-current-dissipation mode (standby mode), an essential feature of automotive systems, enabling systems to be made smaller.

(3) Compact, low-pin-count package for lower system costs

All these functions are incorporated in a compact, low-pin-count 100-pin QFP, helping to reduce the size of dashboard systems for which only a limited mounting area is available. The 0.65 mm pin pitch enables a low-cost, single-layer printed circuit board to be used, for lower system costs.

2. 32 kHz oscillation from the main clock (single crystal)

32 kHz oscillation for the real-time clock has previously been provided from an external source, but the occurrence of temperature-induced error due to resonator characteristics has led to the provision in the H8S/2282F of a frequency division function that obtains 32 kHz from the main clock, which is subject to only a small degree of error. As a result, not only is accuracy improved, but the number of parts can also be cut through the use of a single crystal, helping to reduce system size and cost.

Mask ROM versions have also been developed -- the H8S/2282M with 128 Kbytes of on-chip ROM and the H8S/2281M with 64 Kbytes. These models are scheduled for volume production in March, 2003.

The existing H8S Series C compiler, assembler, linkage editor, librarian, simulator, debugger, etc., are available as a software development environment. As a hardware development environment, the E6000 realtime emulator is available, and the same emulator unit is used as for the H8S/2646 Series.

Notes: 1. LCD: Liquid Crystal Display

2. CAN (Controller Area Network): A network specification for use in vehicles, proposed by Robert Bosch GmbH of Germany.

3. F-ZTAT (Flexible Zero Turn-Around Time) is a trademark of Hitachi, Ltd.

4. PWM: Pulse Width Modulation

5. HCAN (Hitachi Controller Area Network): Complies with the Bosch CAN Ver. 2.0B active specification. Features FULL CAN support and 16-message buffers.

**< Typical Applications >**

- Automotive electrical equipment: Dashboard control, chassis control, car audio systems, etc.
- Industrial equipment: FA equipment, etc.

**< Prices in Japan >(For Reference)**

<b>Product Code</b>	<b>Flash Capacity (Bytes)</b>	<b>Package</b>	<b>Sample Price (Yen)</b>
H8S/2282F (HD64F2282)	128K	QFP-100 (14 mm × 20 mm)	1,700

**< Specifications >**

<b>Item</b>		<b>Specifications</b>		
Product Code		F-ZTAT Version	Mask ROM Version*	Mask ROM Version*
		H8S/2282F (HD64F2282)	H8S/2282M (HD6432282)	H8S/2281M (HD6432281)
Memory	ROM (bytes)	128K (flash memory)	128K	64K
	RAM (bytes)	4k		
Process		0.35 $\mu$ m CMOS		
Operating frequency/ power supply voltage		4 MHz to 20 MHz / 4.5 V to 5.5 V		
Operating temperature		-40°C to +85°C		
CPU core		H8S/2000 CPU core <ul style="list-style-type: none"> <li>General registers: 16 bits <math>\times</math> 16</li> </ul>		
Timers		16-bit general-purpose timer (TPU): 3 channels <ul style="list-style-type: none"> <li>16-bit input capture input/output compare <math>\times</math> 8</li> </ul>		
Stepping motor timer		Motor control PWM timer: 2 channels <ul style="list-style-type: none"> <li>16 10-bit PWM outputs</li> <li>Large-current port: IOH, IOL = 40 mA (max.), <math>\Sigma</math>IOH, IOL = 220 mA (max.)</li> </ul>		
Serial communication interface		8-bit synchronous/asynchronous: 2 channels		
CAN		HCAN $\times$ 1 channel (Compliant with Bosch CAN Ver. 2.0B active specification, FULL CAN support/16-message buffer) CAN bus wakeup function		
A/D converter		10-bit resolution $\times$ 8 channels		
LCD controller		28 segment lines $\times$ 4 common lines		
I/O ports	Input/output	64 (large-current ports: 16)		
	Input	8		
Clocks		System clock oscillation (4 MHz to 20 MHz crystal resonator, ceramic resonator) External clock 32 kHz generated from system clock by internal frequency division		
Interrupts	External sources	7		
	Internal sources	28		
Power-down functions		6 modes: <ul style="list-style-type: none"> <li>Sleep mode</li> <li>Software standby mode</li> <li>Hardware standby mode</li> <li>Subsleep mode</li> <li>Subactive mode</li> <li>Watch mode</li> </ul> Plus module stop function		
Package		QFP-100 (14 mm $\times$ 20 mm, 0.65 mm pin pitch)		

\* Under development

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Information contained in this news release is current as of the date of the press announcement, but may be subject to change without prior notice.

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